

SOUTH FLORIDA WATER MANAGEMENT DISTRICT



South Florida Water Management District

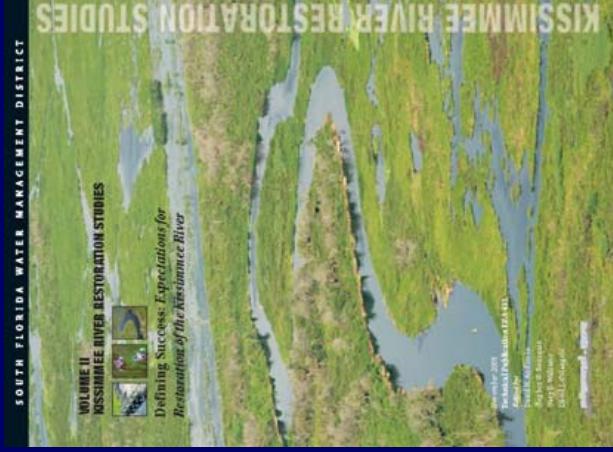
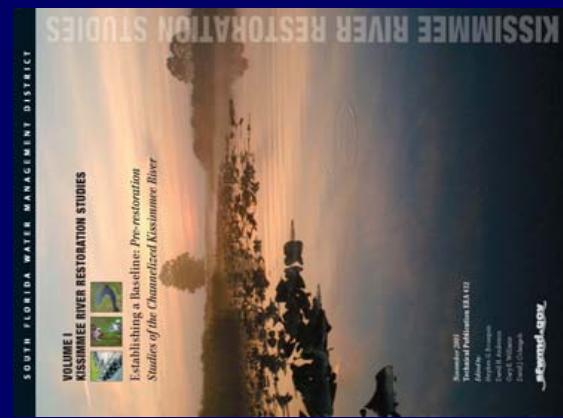
WRAC MEETING AGENDA ADDENDUM

October 5, 2006

Supporting documents for the following item have been added:
Item #:6

See supporting document: [WRAC_PRES_Compendium.pdf](#)

Publication of Volumes I and II of Kissimmee River Restoration Studies

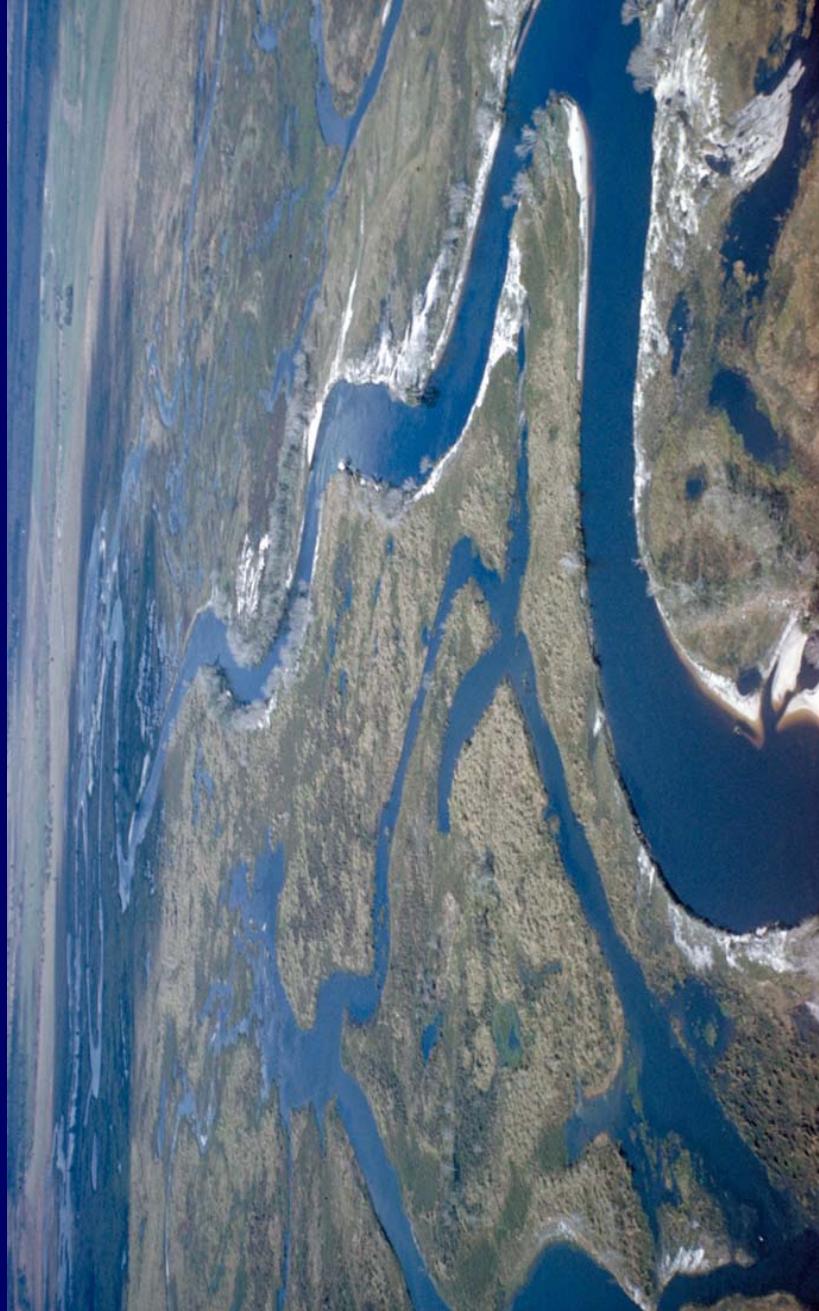


Kissimmee River Impetus for Channelization: Flood Control



Kissimmee River Restoration Project

- Goal: restore ecological integrity to the central region of the river/floodplain
- Land acquisition – approximately 105,000 acres
- Headwaters Revitalization Project



Kissimmee River Restoration Project

KISSIMMEE RIVER RESTORATION



- Backfill 22 mi of C-38 canal
- Recarve/reconnect more than 40 mi of river channel
- Remove 2 water control structures
- Comprehensive Restoration evaluation Program



Volume I. *Establishing a Baseline: Pre-restoration Studies of the Channelized Kissimmee River*

- Documents the history and scope of the Kissimmee River Restoration Project and Evaluation Program
- Describe findings for the full range of restoration evaluation studies, including:





Volume 1 Data Analysis

- Develops reference conditions that represent the Kissimmee River/Floodplain system with pre-channelization ecological integrity (pre-1962)
- Summarizes baseline conditions for the channelized river remnants (1971-1999)
- Evaluates changes due to channelization based on comparisons of reference and baseline conditions



Selected Major Impacts of Channelization

- Drastically narrowed water level variation and extent of floodplain inundation
- Caused more erratic flow patterns, increasing the days with no flow
- Decreased the concentration of dissolved oxygen and adversely affecting flora & fauna
- Prior to channelization, wetland vegetation occupied over 80% of the floodplain
- By 1974, over 60% of wetlands had disappeared and replaced with upland vegetation



Selected Major Impacts of Channelization, continued

- Riverine fish communities were dominated by species characteristic of non-flowing and/or degraded systems
- Number of fish species in floodplain marshes decreased from 24 to 10
- Severely alteration of river/floodplain invertebrate and amphibian taxa (diversity and reproduction)
- Decline in species and density of long-legged wading birds and waterfowl
- Significant loss of habitat for wood storks, bald eagles, and snail kites



Major **Conclusions**

- Channelization greatly altered the hydrology of the river and floodplain
- Hydrologic changes caused drastic changes in all of the components studied
- Reductions in floodplain wetlands and water quality
- Aquatic invertebrates, desirable fish, and wading and water birds responded with species/population declines



Volume II. Defining Success: Expectations for Restoration of the Kissimmee River

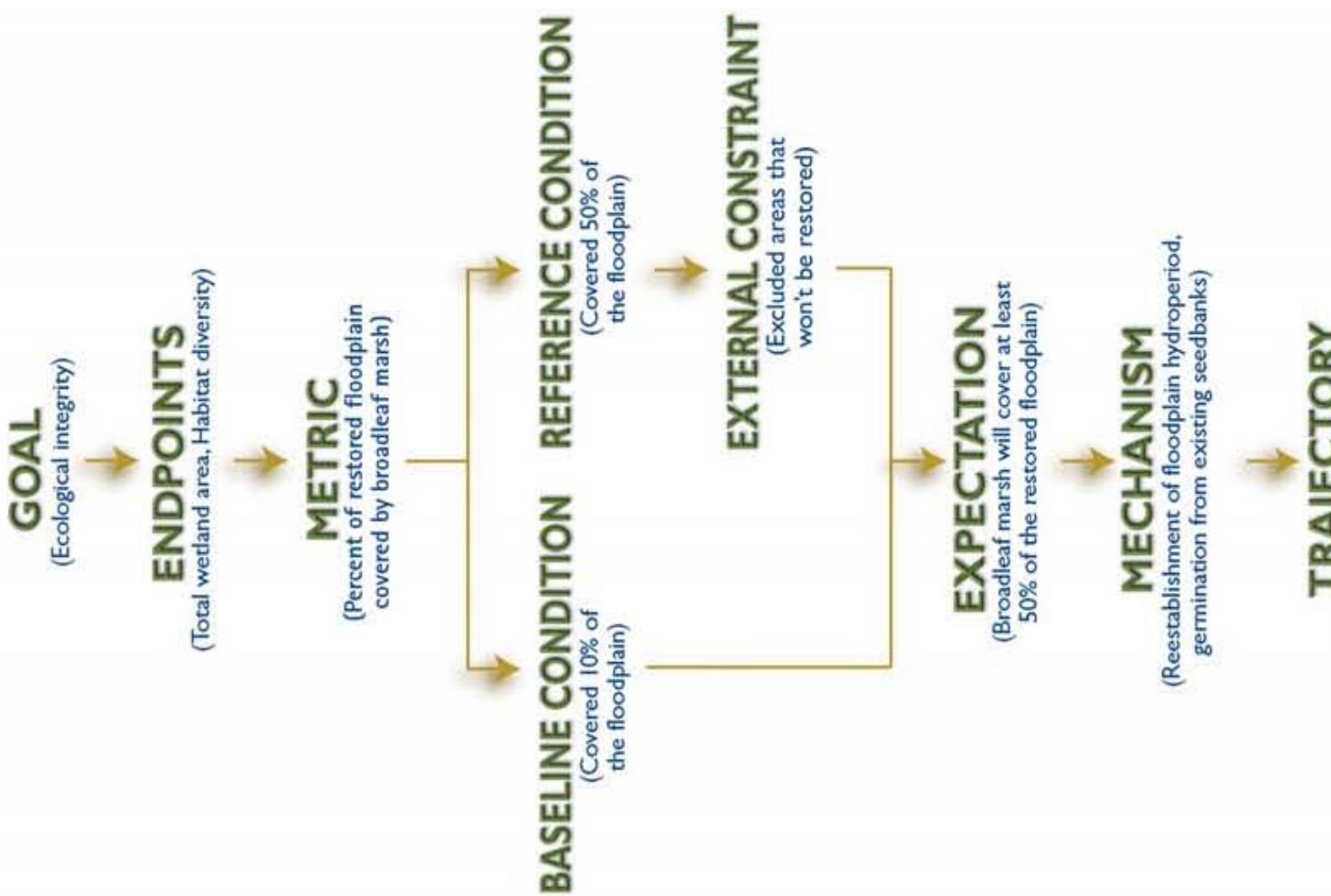


Kissimmee River Restoration Studies

Volume II Summarizes the Development Restoration Expectations

Restoration Expectation – A description of the condition of ecological integrity for one or more specific metrics that describe any of the non-living (abiotic) and living (biotic) components within the Kissimmee River/Floodplain ecosystem.





Developed 25 Restoration Expectations

Hydrology, Geomorphology, Water Quality (9)



Vegetation (5)



Food base (6)



Fish & Wildlife (5)



Selected Expectations

- Continuous flow necessary for the restored channel of the Kissimmee River
- Dissolved oxygen concentrations within 1 m of the channel bottom to exceed 1 mg/L more than 50% the time
- Mean widths of littoral vegetation in restored river channels to decline substantially
- Broadleaf marsh to cover at least 50% of the restored floodplain
- At least 24 wetland amphibian and reptile taxa will be found in broadleaf marsh habitats (once restored from pastures)



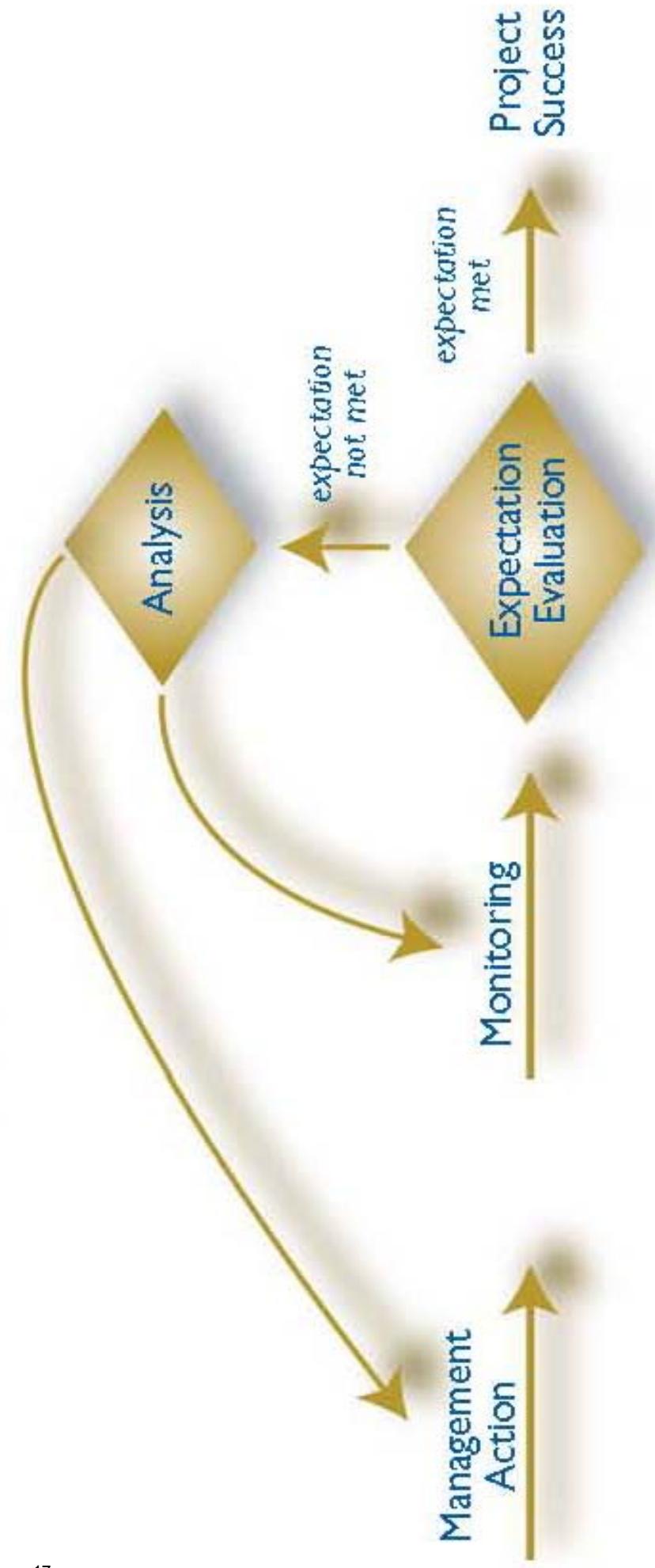


Selected Expectations, continued

- Mean annual density of small fishes (fishes ≤ 10 cm total length) within restored marsh habitats will be ≥ 18 fish/ m^2
- Mean annual dry season density of long-legged wading birds on the restored floodplain will be ≥ 30.6 birds/ km^2
- Winter densities of waterfowl within the restored floodplain will be ≥ 3.9 ducks/ km^2 . Species richness will be ≥ 13

Restoration expectations gauge restoration success and guide management of the recovering ecosystem

ADAPTIVE MANAGEMENT



Questions?



Supporting documents for the following item have been added:

Item #:7

See supporting document: [KCOL_Oct06.pdf](#)

See supporting document: [KBMOS_WRAC_092006Final_jj.pdf](#)

Kissimmee Chain of Lakes Long-Term Management Plan



**SFWMD Governing Board Resolution
No. 2003-468**

- Adopted in April 2003
- Directs SFWMD staff to work with U.S. Army Corps of Engineers and other interested parties to develop a Long-Term Management Plan for Kissimmee Chain of Lakes

**SFWMD Governing Board Resolution
No. 2003-468 (Cont.)**

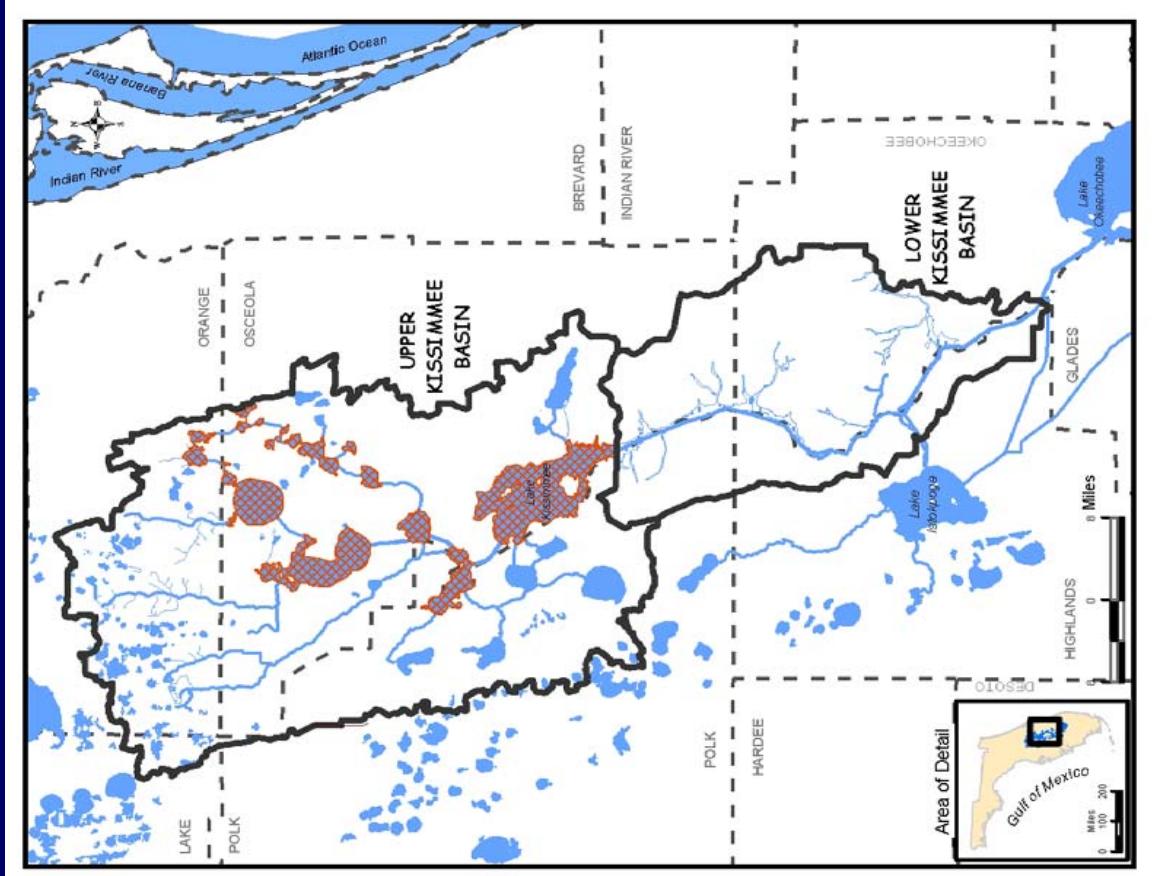
- Improve health and stability and sustainability of Kissimmee Chain of Lakes
- Consider downstream conditions & requirements in Kissimmee River and Lake Okeechobee



Goals

- Hydrologic Management
- Habitat Preservation & Enhancement
- Aquatic Plant Management
- Water Quality Improvement
- Recreation and Public Use

Geographic Scope = 19 Regulated Water Bodies in Upper Kissimmee Basin



Partner Agencies

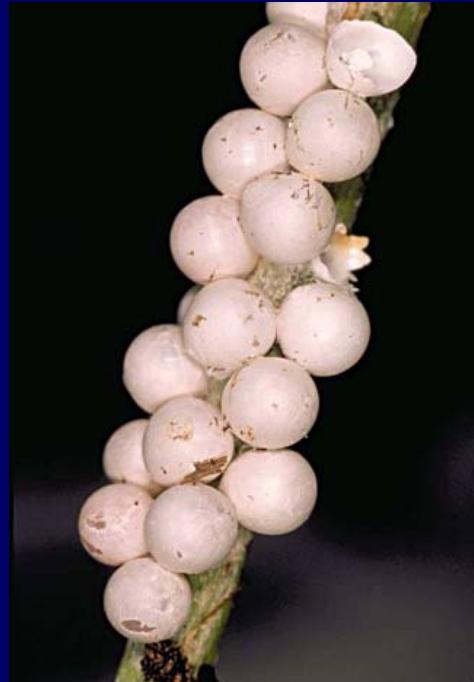
- South Florida Water Management District
- Florida Fish and Wildlife Conservation Commission
- Florida Dept. of Environmental Protection
- Florida Dept. of Agriculture and Consumer Services
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- Local governments and community leaders
- Other stakeholders (Audubon, public, and others)

Final Document to Contain the Following Key Products

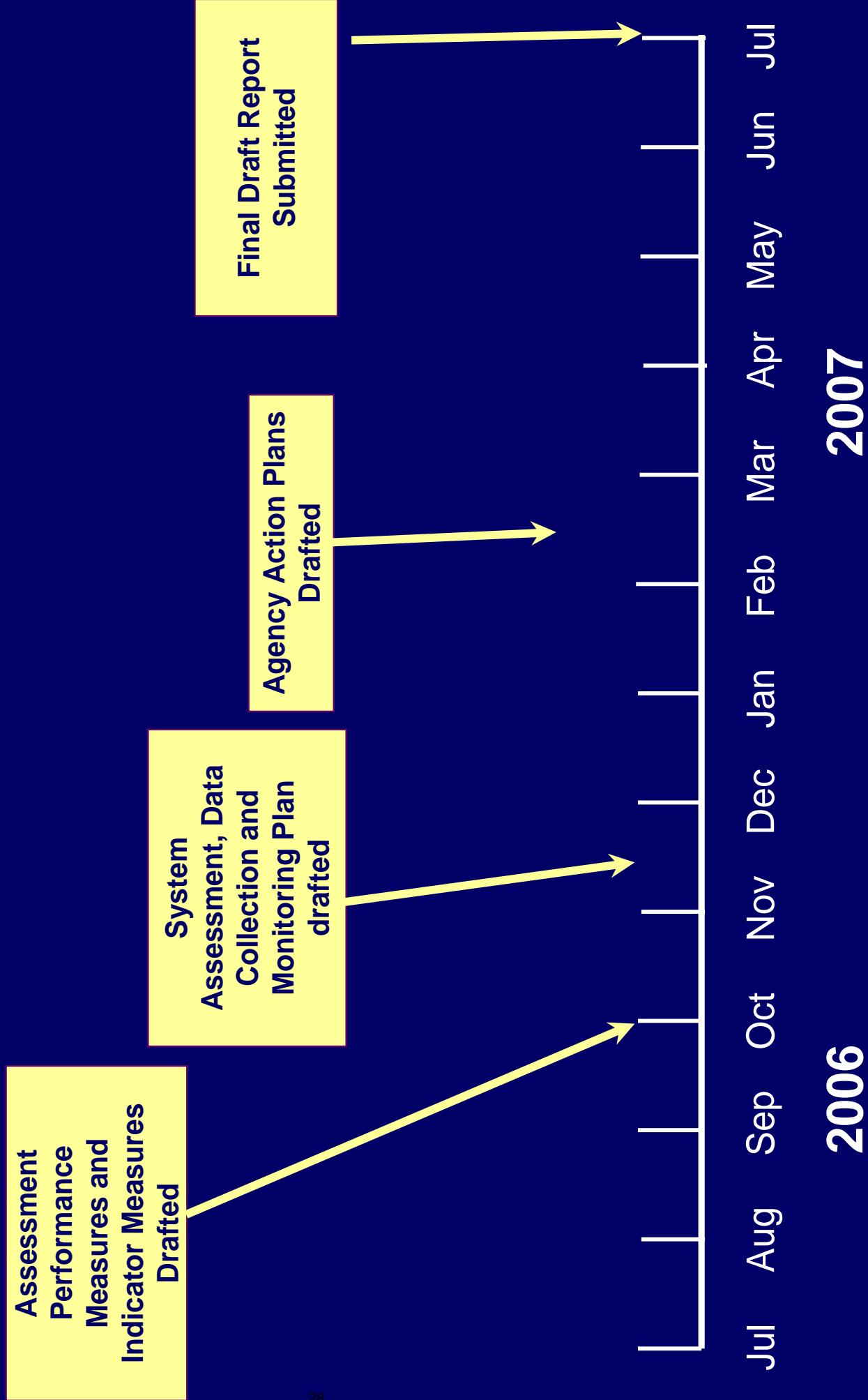
- Scope and Goals
- Conceptual Ecological Model
- Baseline and Reference Conditions
- Assessment Performance Measures and Indicator Measures
- System Assessment
- Data Collection and Monitoring Plan
- Agency Action Plans

Examples of Assessment Performance Measures and Indicator Measures

- Performance Measures
 - Number of Bald Eagle Nests
 - Largemouth Bass Recruitment
 - Trophic State Index
- Indicator Measures
 - Palustrine Wetlands (area and distribution)
 - Apple Snails (density and distribution)



Remaining Schedule



Kissimmee Basin Modeling and Operations Study (SFWMD)

Environmental Impact Statement for Modification of Kissimmee Basin Structure Operating Criteria (US Army Corps of Engineers)





Kissimmee Watershed Modeling and Operations Study (KBMOS)

- Goal: Assess how current structure operations can be modified to better balance flood control, water supply, aquatic plant management, and natural resource operations objectives
- Constraints:
 - No modifications to existing water management infrastructure
 - No additional real estate interests
- Related Projects:
 - USACE Environmental Impact Statement on Modifications to Kissimmee Basin Structure Operations (PMP signed in July 2005)
 - Kissimmee River Restoration
 - Kissimmee Chain of Lakes Long Term Management Plan

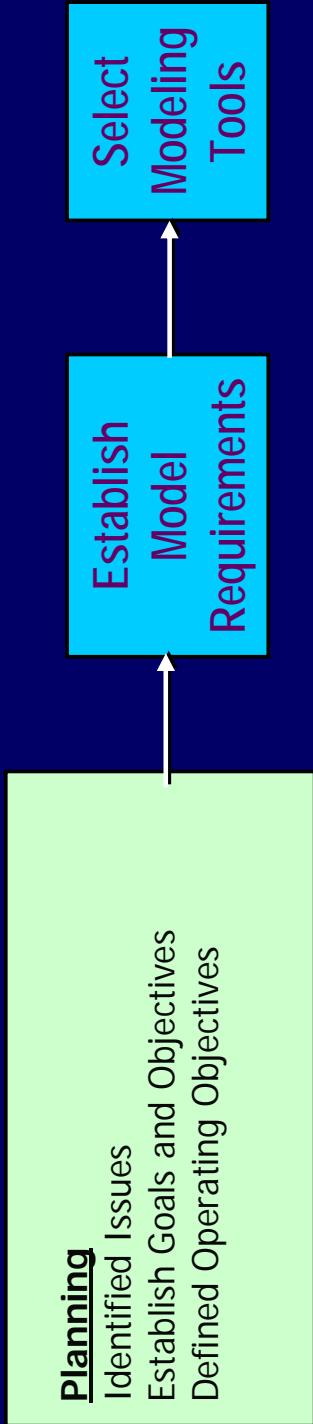


Interagency Study Team

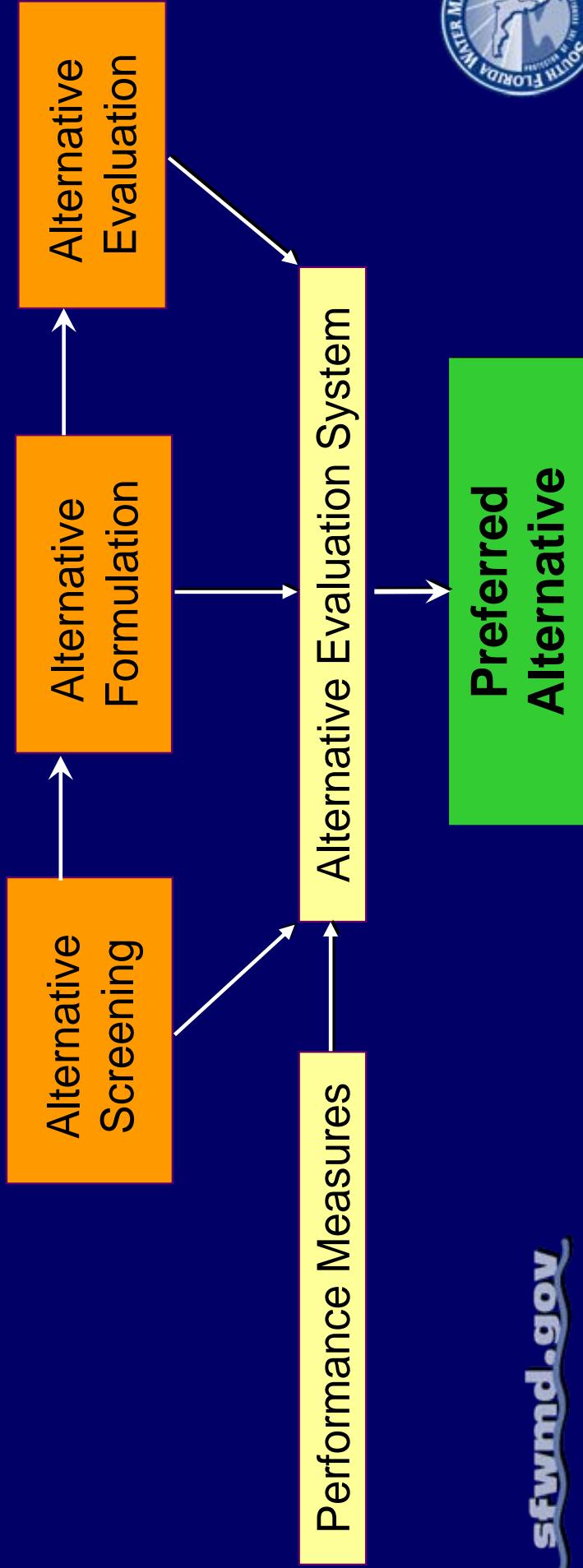
- South Florida Water Management District
- U.S. Army Corps of Engineers
- U.S. Fish & Wildlife Service
- Florida Fish & Wildlife Conservation Commission
- U.S. Environmental Protection Agency
- Florida Department of Environmental Protection
- Florida Department of Agriculture and Consumer Services
- Local Governments
- Other Stakeholders

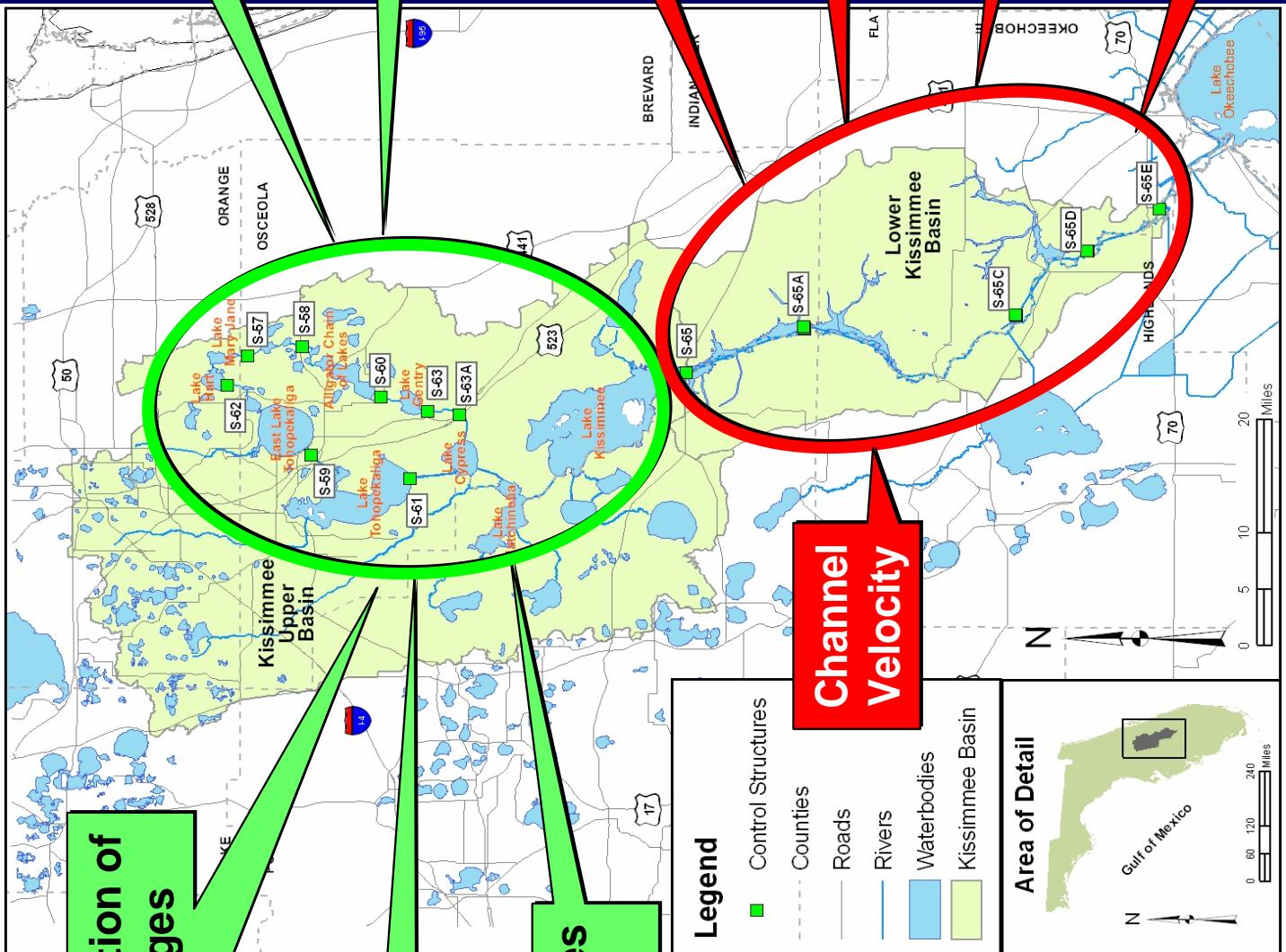


Phase I



Phase II: Alternative Plan Selection Process





Frequency and Duration of High and Low Stages

Stage Fluctuation Range

Stage Seasonality and Variability

Probable High Lake Stages

Discharges and Stages for Hydrilla Mgmt

Continuous Flow

Channel Velocity

Floodplain Hydroperiod

Stage Recessions

Inflows to Lake Okeechobee



Draft Final Evaluation Performance Measures Report (Sep 2006)

Public Review Period
Sept 13, 2005 – Oct 13, 2006

Draft Final

Evaluation Performance Measures
Kissimmee Basin Hydrologic Assessment,
Modeling and Operations Planning Study
Contract No. CN040899-W006



September 2006

Submitted to:

Submitted by:

PBSJ





KBMOS Schedule

Sept 2006 – April 2007:

- Performance measures development
- Modeling tools calibration and verification
- Peer reviews

Through Dec 2007:

- Simulation of base conditions and screening of alternative plans
- Alternative plan formulation, evaluation, selection
- Preparation of interim & long term operating criteria



KBMOS Schedule, continued

Jan 08

Coordinate with USACE for completion of Environmental Impact Statement (EIS) leading to operational changes to address project objectives.

Supporting documents for the following item have been added:

Item #:9

See supporting document: [LOER Rule Wshp Aug-Sep-06.pdf](#)

Lake Okeechobee & Estuary Watersheds Basin Rule

Rule Development Workshops
August & September, 2006

LOER

- The Lake Okeechobee and Estuary Recovery (LOER) Plan was presented to the public on October 10, 2005.
- The plan includes: (see www.sfwmd.gov)
 - Fast Track Reservoir & STA Projects (SFWMD)
 - LO Regulation Schedule Revisions (USACE)
 - Set TMDLs for Tributaries (FDEP)
 - Fertilizer BMPs (FDACS)
 - Alternative Storage (SFWMD)
 - Innovative Land-Use Planning (FDCA)
 - Eliminate Land Application of Residuals (FDEP)
 - Continued Implementation of LOPP & LOWP

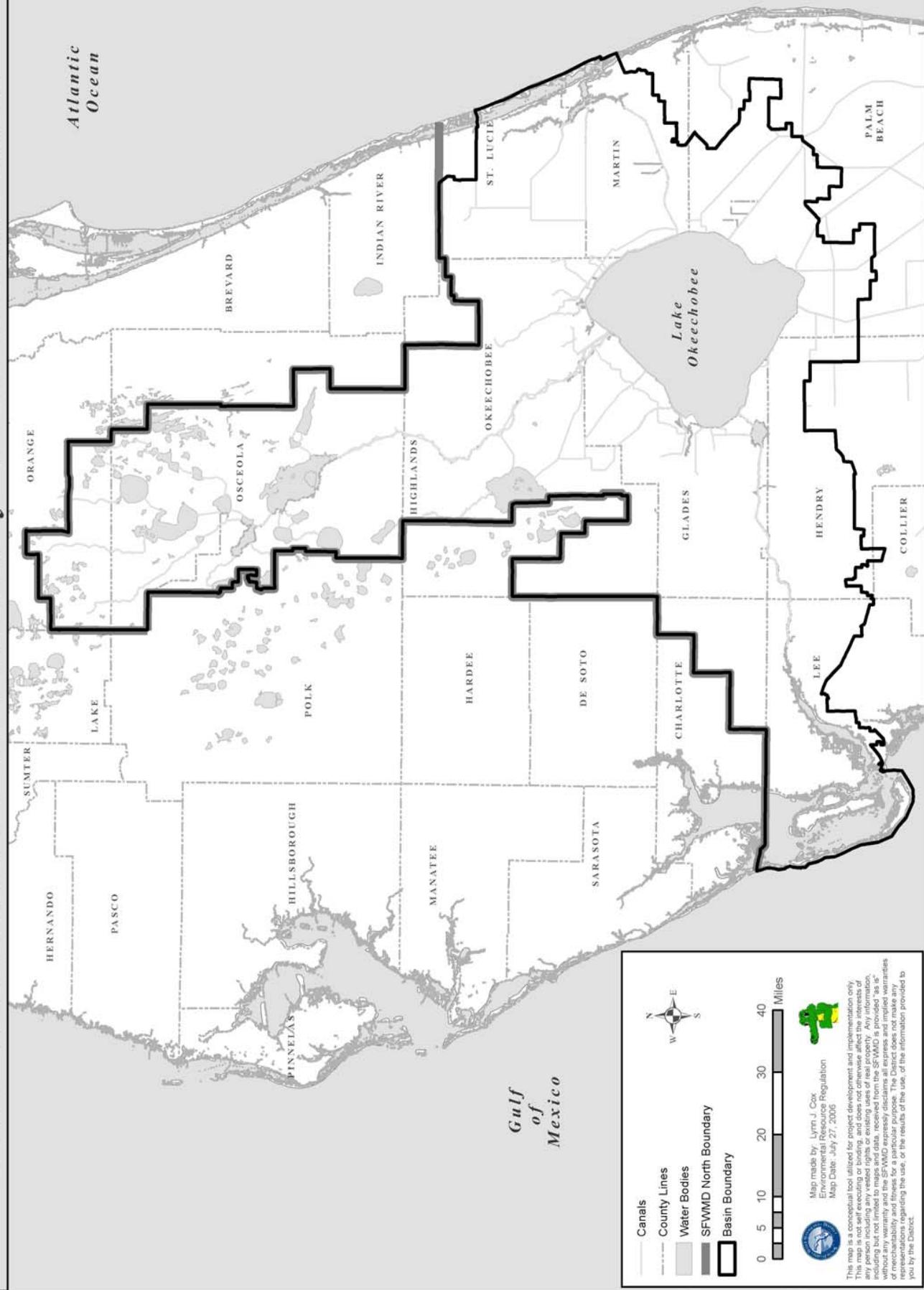
Revise ERP

- The LOER Plan also included Revisions to the Environmental Resource Permit (ERP) requirements for basins draining to Lake Okeechobee, Caloosahatchee and St. Lucie estuaries.
- The primary purpose of this component is to reduce phosphorus loading from new development in the watershed.

Special Basin Rule

- Proposed is a basin rule currently known as the Lake Okeechobee and Estuary Watersheds Basin Rule.
- The requirements in a basin rule supplement the existing ERP requirements for projects within a specific basin boundary.
- The Governing Board Authorized initiation of Rule Development on February 8, 2006.

Lake Okeechobee and Estuary Watershed Basin



Map made by Lynn J. Cox
Environmental Resource Regulation
Map Date: July 27, 2006

This map is a conceptual tool utilized for project development and implementation only. It is not self-executing or binding, and does not otherwise affect the interests of any person, including any vested rights or existing laws of real property. Any information, without any warranty and the SFWMN expressly disclaims all express and implied warranties of merchantability and fitness for a particular purpose. The District does not make any representations regarding the use or the results of the use, the information provided to you by the District.

Basin Rule Concept

- Develop BMP menu system to achieve 80% phosphorus removal efficiency for the proposed use (state water policy, 62-40, F.A.C.).
- Use a “treatment train” approach that includes site design source controls, conveyance and pre-treatment BMPs, and stormwater system design enhancements
- Intended to provide flexibility to incorporate BMPs that are appropriate for the type of project

Basin Rule Concept

- Develop models to estimate annual discharge volume from an unimproved condition and from the developed condition (model includes ground water/surface water interaction, ET, BMPs, etc.)
- Demonstrate that developed condition volume is less than or equal to the unimproved condition

Public Comments Requested

- Please submit written comments by
September 22, 2006 to:
 - Damon Meiers, Deputy Director; or
 - Yvette Bonilla, Regulatory Coordinator
 - South Florida Water Management District
 - Environmental Resource Regulation Dept., MSC 4210
 - P.O. Box 24680, West Palm Beach, FL 33416-4680
 - (800) 432-2045 (Ext. 6876) or (561) 682-6876
dmeiers@sfwmd.gov
 - (800) 432-2045 (Ext. 6921) or (561) 682-6921
ybonilla@sfwmd.gov

Additional Information

- Basin Rule Website: www.sfwmd.gov
 - Click on “What We Do”
 - Click on “Permitting”
 - Click on “Rule Development”
 - Look under “Lake Okeechobee and Estuary Recovery”
- Procedural Issues Contact:
 - Jan Sluth, Paralegal
 - South Florida Water Management District
 - Office of Counsel, MSC 1410
 - P.O. Box 24680, West Palm Beach, FL 33416-4680
 - (800) 432-2045 (Ext. 6299) or 561-682-6299
 - jsluth@sfwmnd.gov

Supporting documents for the following item have been added:

Item #:10

See supporting document: [Bold DECOMP.pdf](#)

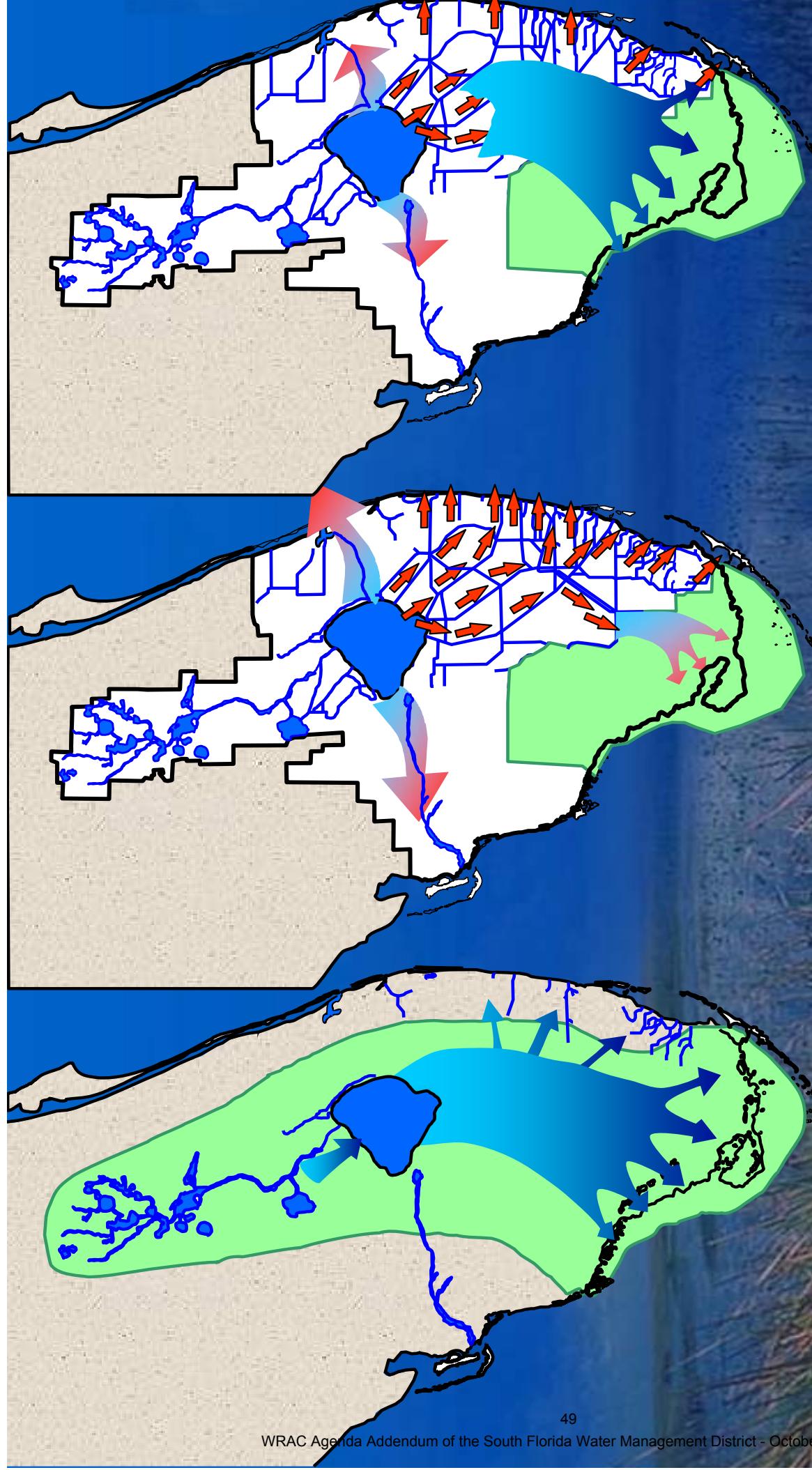
Restoration of the Everglades

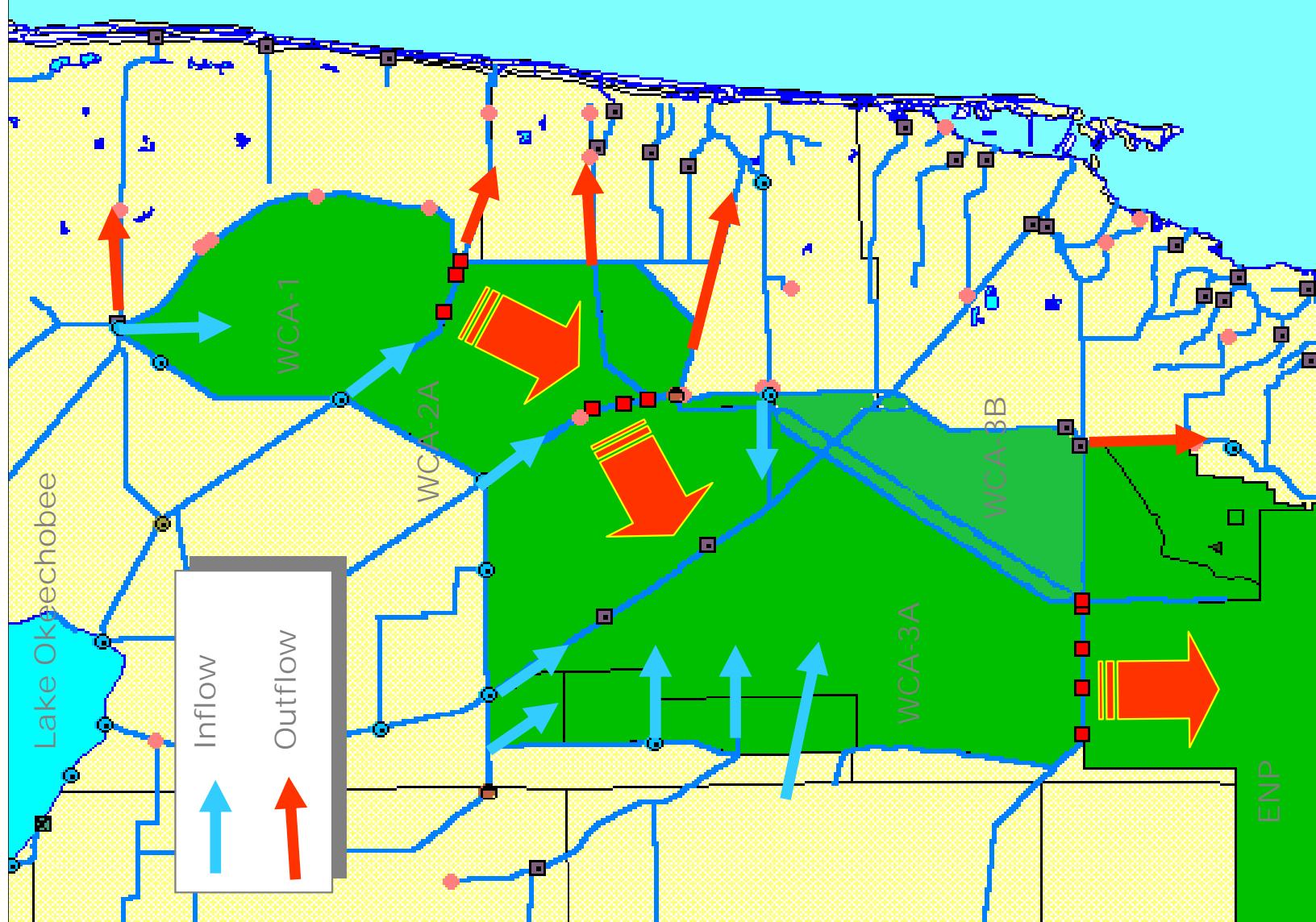
WCA-3A

**Decompartimentalization
and Sheetflow
Enhancement**

Everglades Restoration Goal

Future Flow
Current Flow
Historic Flow





Current Flow Patterns through Everglades

- Major structures within the WCAs discharge south toward Everglades National Park
- Smaller structures discharge east, primarily for water supply purposes
- Flows largely confined to Western Shark Slough
- Little capacity to move water into Northeastern Shark Slough

Modified Water Deliveries to Everglades National Park

Authorized as part
of the Everglades
National Park
Expansion Act of
1989:

- \$398 million
 - construction by
Corps of Engineers
- Includes:**
- Re-establishing
historical flow path
into ENP.
 - Protection of
developed areas,
housing, businesses,
and agriculture areas
 - Improvement to
Tamiami Trail to
allow greater flows
and higher water
levels

Status:

- Construction is
underway

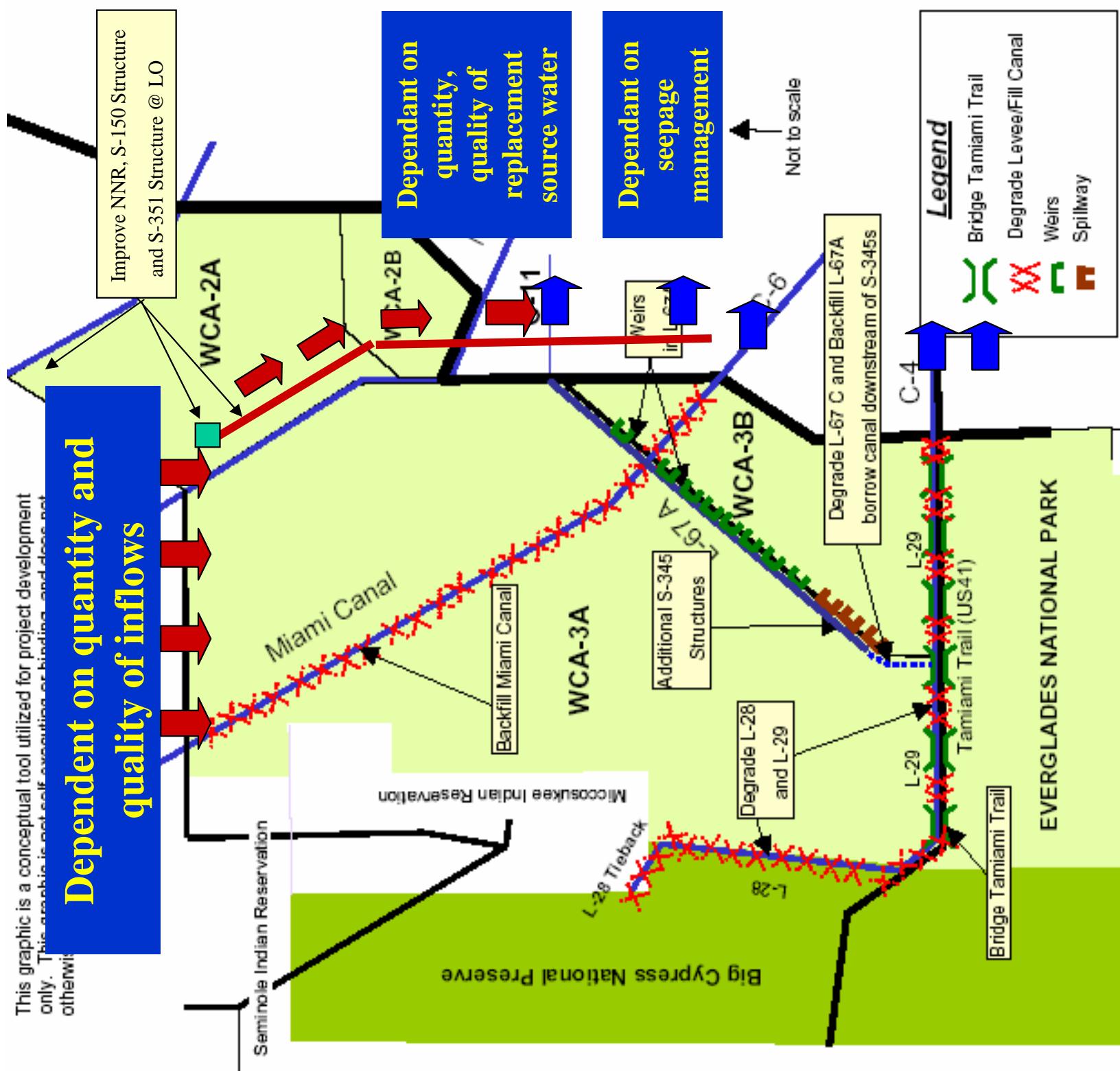


This graphic is a conceptual tool utilized for project development only. The graphic is not scale, location, or binding, and does not otherwise represent the actual project.

Decomp Yellow Book Plan

**"Heart" of the
restoration
effort**

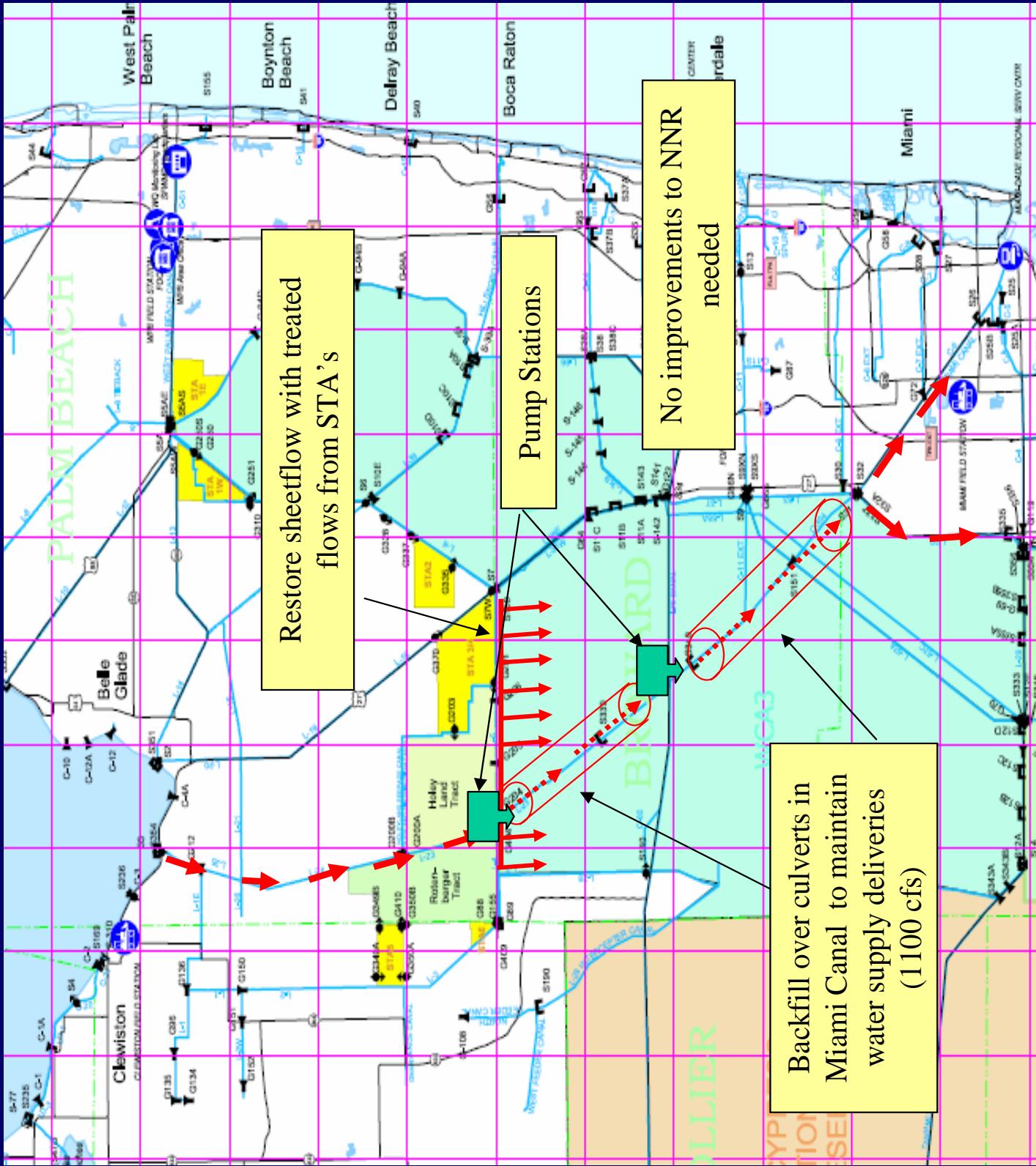
**Stakeholders
eager to see
progress on
Decomp**



Current Issues with Implementation of Decompo Plan

- Lack of consensus on handling restoration trade-offs
 - Hinders ability to agree on performance measures and targets and to move forward on plan design and evaluation
- Uncertainty on how to quantify benefits of sheetflow and evaluate cost-effectiveness
 - Debate on model types, accuracy, and scale needed to distinguish between alternatives
- Construction timing and project sequencing
 - Sufficient storage to meet next-added justification
 - Sufficient storage to prevent over-drainage of natural areas
 - Sufficient water supply and seepage management to meet savings clause

Miami Canal Backfill Proposal



Benefits of Miami Canal Proposal

- Will restore the natural sheet flow patterns in the WCA-3A
- Will prevent the “short circuiting” of flows to the south and thus the overdrying of northern 3A and the ponding effect in southern WCA-3A
- Adjacent spoil from the Miami Canal excavation is not sufficient to backfill canal, thus additional material would be required or only plugs used.
- Plan would not require excavating or enlarging North New River across Everglades
- Excess material not needed will be used to construct tree islands
- Meets Savings Clause needs for water supply and provides potential for increased water supply to Broward and Miami-Dade County
- Provides clear route south from Lake Okeechobee for Discharges not subject to water levels in WCA's or STA treatment capacity
- Reduces high lake stages and damaging discharges to the estuaries.
- Allows only clean water to be discharged into Everglades from STA's and overland flow through WCA 3A.

Water Quality Benefits of Miami Canal Proposal

- WCA's will have better water quality inputs as a larger percentage will come from the STA's
- Less overloading of STA's
- Filling the Miami Canal reduces the route for exotics to travel
- Reduces nutrient loading to ENP by restoring natural sheet flow through WCA 3A and allowing natural assimilation of nutrients

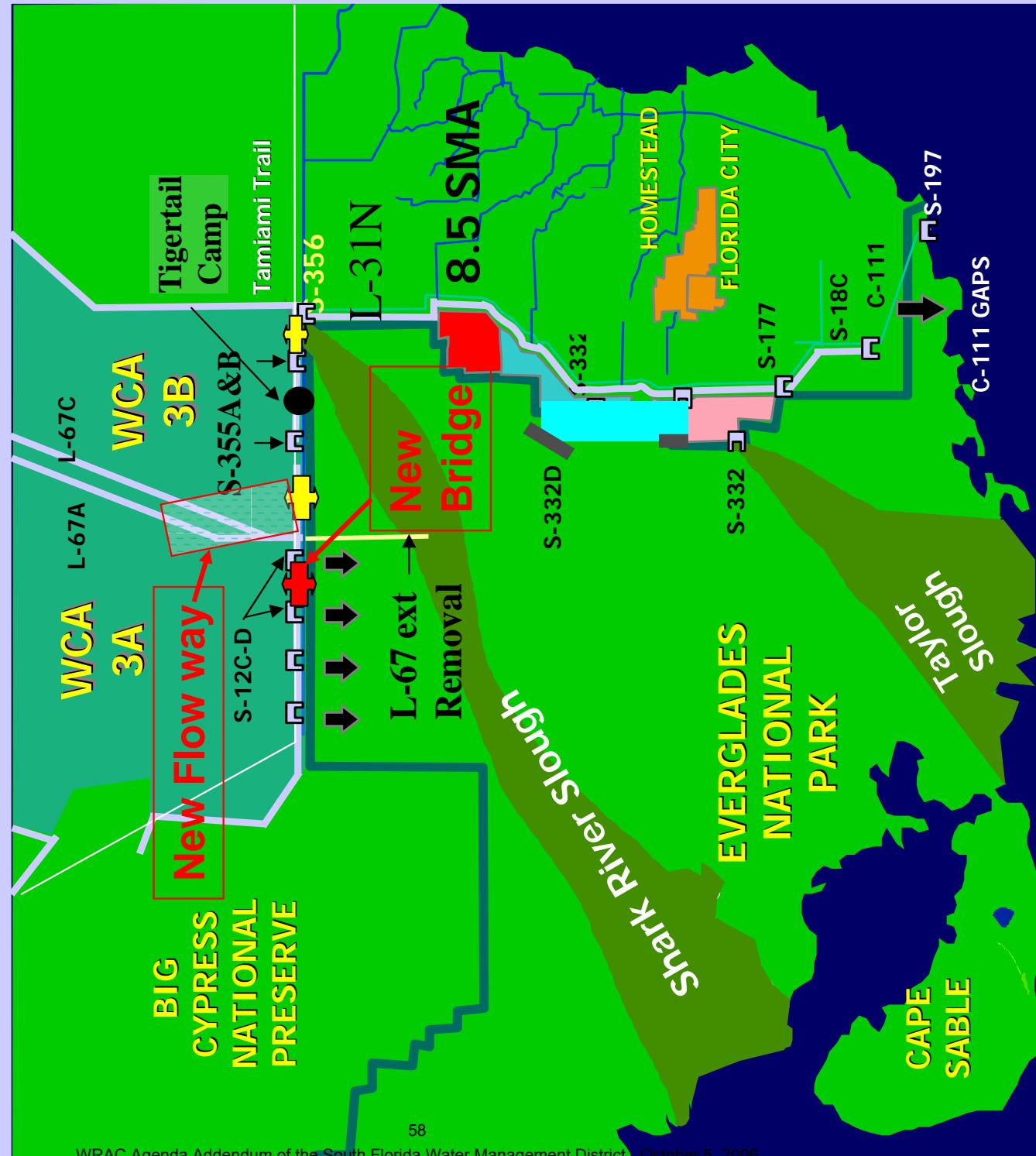
Lower Decomp Plan

- This part addresses flow patterns and ponding in lower end of WCA 3A by:
 - Constructing a flow path from the lower southeast end of WCA 3A through L-67's and southwestern corner of WCA 3B into L-29 and through the new Mod Waters western 2 mile bridge. This will help restore more flow into northeast Shark River Slough.
 - Constructing a new 1-2 mile bridge on Tamiami Trail between S-12D and S-12C to allow free flow of water from WCA 3A to reduce high water events in WCA 3A and help restore the natural flow though concept for WCA 3A.

Lower DECOMP Plan

Decomp Bridge and Flow through:

- New Bridge between S-12C and D to allow for free flow of water from WCA 3A.
- New Flow way from WCA 3A through 3B into NESRS



Bold Decom^p Plan Cost Estimate

- The cost will range from about \$1 to \$1.5 billion depending on final plan and capacity provided. High potential to achieve much of the benefits of this plan at the lower cost.

Comments?

**Supporting documents for the following item have been added:
Item #:11**

See supporting document: [Evaluation of Conveyance Improvement Options.pdf](#)

Evaluation of Conveyance Improvement Options

**Lower East Coast Regional Water
Supply Plan (c. 1996)**

Tommy B. Strowd, P.E.
Assistant Deputy Executive Director, CERP

Lower East Coast Regional Conveyance Alternatives Study

- LECRWSP evaluated numerous physical facility options to address urban, agricultural and environmental water issues for the 2010 planning horizon
- LECRWS preceded CERP
 - Primary focus was not ecosystem restoration
- Physical water conveyance was an important consideration
 - Conveyance from storage to use
 - Lake Okeechobee
 - Lower East Coast
 - Conveyance capacity
 - Loss due to seepage

Lower East Coast Regional Conveyance Alternatives Study

- SFWMD contracted with Gee & Jenson Engineers-Architects-Planners, Inc.
- Report delivered in February, 1996
- Evaluated regional conveyance options
 - Canal improvements
 - Widening
 - Deepening
 - Channel lining
 - Pipelines

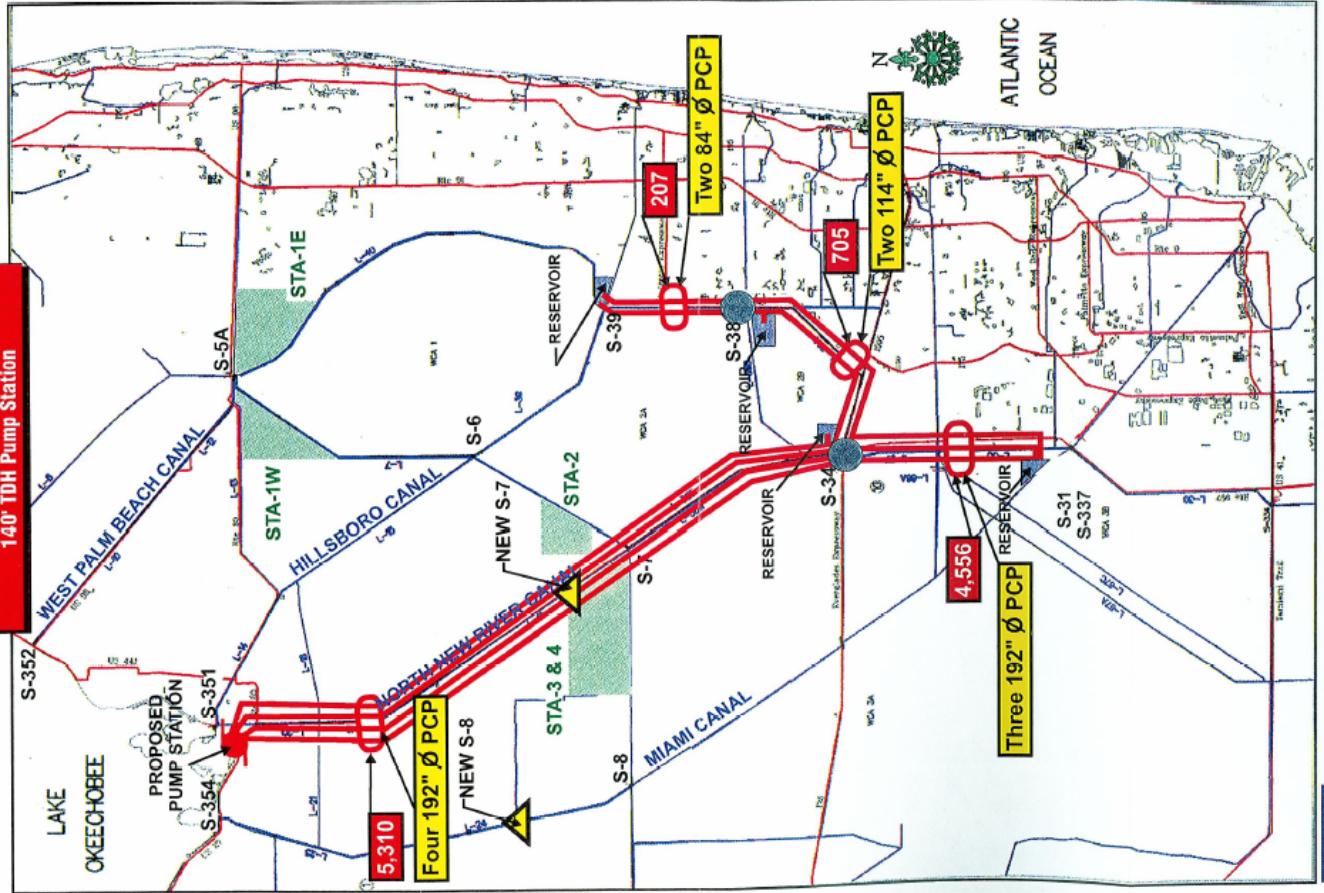
Pipeline Conveyance Options

- Evaluated wide-range of water deliveries to LEC
 - 33%, 67%, & 99% of 2010 regulatory, environmental and water supply discharges
 - 500 to 5,300 cfs
 - Determined by early version of the SFWMM
- Configuration used North New River Canal
 - Source: Lake Okeechobee
 - Use: Miami-Dade, Broward & Palm Beach counties

S O U T H F L O

L O W E R E A S T C O A S T R E G I O N A L C O N V E R A N C E A L T E R N A T I V E S

99 Percentile 2010 Water Supply Flows
Multiple Pipelines Option
140' TDH Pump Station



Pipeline Segment Junction
Proposed Reservoir

5,310
STA: STORMWATER TREATMENT AREA

MILES
0 5 10 15

FEBRUARY, 1996

FIGURE NO. IV - 8

GEE & JENSON
Engineers-Architects-Planners, Inc.

sfwmd.gov

Pipeline Conveyance Options

- Single large diameter pressurized concrete pipeline
 - 2 to 4 parallel pipes
 - Diameters ranged from 70" (5 ft) to 192" (16 ft)
 - 1-High capacity, High head pump station
 - Discharge pump head ranged from 70 ft. to 140 ft.
- 3 Attenuation reservoirs conceptually envisioned at discharge points in Miami-Dade, Broward & Palm Beach counties
- Conceptual costs ranged from \$0.7 B to \$2.5 B
 - 1996 dollars

Conveyance Alternative Study Findings

- Canal channel conveyance improvements were more cost effective
 - Several reaches currently have sufficient capacity
- NNRCC was the most cost effective route to deliver water from Lake Okeechobee to the LEC
 - Most direct route from supply to demand
 - Best accessibility for operations and maintenance
 - Minimal environmental impact
- Existing EAA canal hydraulics identified by the study were incorporated into the SFWMM
 - Remain a key component of the model today.

Questions